Modal dispositionalism and necessary perfect masks

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Abstract

Modal dispositionalism is the view that possibilities are a matter of the dispositions of individual objects: it is possible that *p* if and only if something has a disposition for *p* to be the case. We raise a problem for modal dispositionalism: nothing within the theory rules out that there could be necessary, perfect masks, which make the manifestation of a disposition impossible. Unless such necessary perfect masks are ruled out, modal dispositionalism runs the risk of failing to provide a sufficient condition for possibility, and indeed of engendering contradictions. But to rule them out, modal dispositionalism would have to revise a crucial tenet of the view, its localism.

1. Introduction

Modal dispositionalism is the view that metaphysical possibilities are a matter of the dispositions of individual objects. The possibility that a vase breaks, for instance, is a matter of its being fragile; the possibility that Socrates be a carpenter is a matter of his having the relevant dispositions (in a wide sense of 'dispositions', including abilities, potentials, tendencies, and the like). Different versions of dispositionalism have been proposed (Borghini and Williams 2008, Jacobs 2010, Vetter 2015, Anjum and Mumford 2018), but we will here focus on the most detailed version, developed in Vetter 2015.

Dispositionalism ought to be at least formally adequate, i.e., capture the logic of modality, and extensionally correct, i.e., provide necessary and sufficient conditions for modal truths. Dispositionalists tend to focus on the challenge of providing *necessary* conditions, arguing that it can be met once we acknowledge dispositions of very low degrees (to cover which, the term 'potentiality' is introduced in Vetter 2015 – we will here use 'disposition' and potentiality interchangably); and iterated dispositions/potentialities (where an iterated potentiality is a potentiality for a potentiality for ...; see Vetter 2015, 4.6). Little attention has been paid to the challenge of providing *sufficient* conditions. We wish to argue that this challenge is formidable indeed.

Here is the official statement of the view (Vetter 2015, 197, 203, labels changed):

(Def◇) It is possible that *p* iff something has, had or will have an iterated potentiality for it to be the case that *p*.

(Def□) It is necessary that *p* iff it is not possible that not-*p*, that is, iff nothing has, had or will have an iterated potentiality for it to be the case that not-*p*.

We will challenge (Def◇) by appeal to *necessary perfect masks*. A disposition is masked if conditions obtain that would prevent its manifestation (given otherwise suitable circumstances). By themselves, masks do not challenge dispositionalism: packing a fragile vase in bubble-wrap may prevent its breaking here and now, but it does not detract from the *metaphysical possibility* that the vase break. But imagine that we had a *perfect* mask: something which, whenever present, makes the manifestation of our disposition impossible. That would still leave the possibility of the vase's breaking *in the absence* of the mask. So imagine further that the mask is not merely perfect, but that it obtains with necessity (either *simpliciter*, or conditional on the vase's existence), and is necessarily a perfect mask for that disposition. Then we have a disposition that *cannot*, ever, be manifested – a disposition

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for it to be the case that *p* without the possibility that *p*.

Cases like this are occasionally found in the literature (e.g., Kripke's 'killer yellow', cp. Lewis 1997; 'g-bulls' in Aimar 2019, 1683-1685; and unexercisable abilities in Spencer 2017), and have been noted as problematic for dispositionalism (Vetter 2015, 291; Busse 2015, Contessa 2016, fn.1, Werner 2021; Jenkins and Nolan 2012 provide examples of unmanifestable dispositions, but of a different structure). We aim to show that the problem is structural, and threatening independently of any particular examples. It arises from a tenet that is central to dispositionalism: its localism, i.e., its locating the source of modal truths in individual objects having certain intrinsic properties. We take this problem to be, in David Lewis's words, the 'big bad bug' for modal dispositionalism (cp. Lewis 1994). We are hopeful that it might be solved; our purpose in this paper is to expose the problem.

§2 provides the general structure of the problem; §3 illustrates the problem with two examples; §4 considers responses to it and diagnoses its source.

2.   Structure

The problem can be formulated in three premises:[1]

(Potentiality) *a* has a potentiality to Φ.

(PerfectMask) Neither *a* nor anything else has an iterated potentiality for *a* to Φ-while-*q*.

(Necessity) Nothing has an iterated potentiality for not-*q*.

(Potentiality) is clear enough: we have a potentiality, which by (Def◇) directly gives rise to a possibility that *a* Φs.

(PerfectMask) specifies a perfect mask in dispositionalist terms. A mask, *q*,[2] reduces a disposition's degree: the degree of *a*'s disposition to Φ-while-*q*

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[1]We individuate dispositions solely by their manifestation; see Vetter 2015, chs.2-3. The argument may be rephrased by adding a stimulus condition.

[2]For simplicity, we construe masks as propositions. If masks are objects, then *q* is the proposition

is lower than the degree of its disposition to Φ, *simpliciter*. (Note that the entire predicate 'Φ-while-q' is in the scope of the potentiality operator, specifying a complex manifestation.) A perfect mask reduces that degree to zero: the object has no disposition or potentiality at all to Φ-while-q. (Perfect-Mask) also precludes that anything else could make q anything less than a perfect mask. By (Def$\Box$), (PerfectMask) entails that it is necessary that not (a Φs-while-q), i.e., it is necessary that not (a Φs and q).

(Necessity) specifies the masks's necessity in dispositionalist terms: nothing has any potentiality for the mask not to obtain. By (Def$\Box$), (Necessity) entails that it is necessary that q.

Together with (Def$\Diamond$) and (Def$\Box$), the three premises yield a contradiction. (Potentiality) together with (Def$\Diamond$) entails that it is possible that a Φs, $\Diamond\Phi a$. (PerfectMask) yields $\Box\neg(\Phi a \wedge q)$, which is equivalent to $\Box(q \rightarrow \neg\Phi a)$. (Necessity) yields $\Box q$. By axiom K, this yields $\Box\neg\Phi a$, and hence by the interdefinability of possibility and necessity, $\neg\Diamond\Phi a$. Contradiction!

So far, we have merely given a recipe for counterexamples. We take the real problem to be structural: there is nothing within the dispositionalist theory that rules out such scenarios. Nevertheless, it will be useful to consider examples of such scenarios.

3. Examples

We begin with a simple example (sketched in Contessa 2016, fn.1) that nicely exemplifies the structure of the problem:

(God) Suppose that there is a necessarily existing and necessarily omniscient, benevolent, and omnipotent (OBO) God, who will make sure that the world takes the best possible course. Suppose, further, that a has a potentiality to sing and that a's singing would take the world off the best possible

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that the mask exists; if they are properties, then q is the proposition that the mask is instantiated; if they are states of affairs, then q is the proposition that the state obtains; and so on.

course. Being OBO, God will act as a perfect, necessary mask for *a*'s potentiality:

(**Potentiality**$_{God}$) *a* has a potentiality to sing.

(**PerfectMask**$_{God}$) Nothing has an iterated potentiality for *a* to sing-while-an-OBO-God-exists.

(**Necessity**$_{God}$) Nothing has an iterated potentiality for it not to be the case that an OBO God exists.

Of course, dispositionalists may reject the premises. Atheism contradicts (Necessity$_{God}$), while nuanced responses to the problem of evil might help reject (PerfectMask$_{God}$). Still, there are combinations of views that are *prima facie* compatible with dispositionalism and give rise to a necessary perfect mask.

A more worrying example arises from some dispositionalists' own commitments (see Vetter 2015, 291):

(Determinism) Assume determinism: where 'S' refers to a previous total state of the world, 'L' to the full laws of nature, and *p* is any true proposition, it is necessary that if S and L, then *p*. Determinism does not exclude things from having unmanifested dispositions, as has been noted by 'new dispositionalists' (e.g., Vihvelin 2013). But it makes the laws and previous state of the world act as a perfect mask for such dispositions: while an agent *a* may have a disposition to sing *simpliciter*, *a* does not have a disposition to sing-while-L-and-S-hold. Moreover, some dispositionalists might have to take this perfect mask to be necessary. For, first, a closely allied project to modal dispositionalism is dispositional essentialism, which takes the laws to be grounded in the dispositional essences of properties, and which may well entail that the laws of nature are metaphysically necessary (Bird 2007, see also Shoemaker 1998, Vetter 2018). Second, it has been noted that dispositionalism is under some pressure to take the very first state of the universe, call it S*, to be necessary (see Vetter 2015, ch.7.6, Kimpton-Nye 2019). For

plausibly potentiality has an inbuilt temporal direction: it can only be manifested once it is possessed. But there was nothing prior to the beginning of the universe. So there is some reason to think that nothing has, had, or will have iterated potentialities for S* not to have held, and hence S* is necessary by (Def□).

We now have another instance of our problem:

(**Potentiality**$_{Det}$) *a* has a potentiality to sing (at time *t*).

(**PerfectMask**$_{Det}$) Nothing has an iterated potentiality for *a* to sing (at *t*)-while-S*-and-L-hold.

(**Necessity**$_{Det}$) Nothing has an iterated potentiality for S*-and-L not to hold.

One of us (Vetter 2015, 291) has previously sketched a response to this problem (taken up, for another problem, by Kimpton-Nye 2018). Say that '*p* is strongly possible just in case the totality of things jointly has the potentiality for it to be the case that *p*[; and that] it is weakly possible that *p* just in case at least something has the potentiality for it to be the case that *p*' (Kimpton-Nye 2018, 126; cp. Vetter 2015, 199f.). Metaphysical possibility, as defined in (Def◇), is a kind of weak possibility. Thus contradiction would be avoided if (Determinism) entailed merely that *a*'s singing is, via (Potentiality$_{Det}$), weakly possible and, via (PerfectMask$_{Det}$) and (Necessity$_{Det}$), strongly impossible. But that is not so: our problem is a problem for weak possibility throughout. (PerfectMask) precludes not just the strong, but the weak possibility of *a*'s Φing-while-*q*: nothing, including *a* itself, individually or jointly has any (iterated) potentiality for *a* to Φ-while-*q*. (Necessity) entails that there is no weak possibility of *q* being false. Given axiom K for weak possibility, these entail that it is *not even weakly* possible for *a* to Φ. Accordingly, in (Determinism), it is not even weakly possible for *a* to sing-while-S*-and-L-hold, nor weakly possible for S* and L not to hold; it follows that it is not even weakly possible for *a* to sing. Distinguishing between weak and strong possibility does nothing to solve either our structural problem or the specific

clash in (Determinism).

Again, the dispositionalist may reject each of the premises. A hard determinist might reject (Potentiality$_{Det}$). Against (PerfectMask$_{Det}$), the dispositionalist may point out that on her localized view of modality, determinism is not a plausible view to begin with (or even necessarily false, see Wilson 2013). Against (Necessity$_{Det}$), she may reject the necessity of laws by allowing for potentialities to go against laws (cp. Vetter 2015, 289f.); or more radically by questioning the notion of a law (as in Cartwright 1983 and Mumford 2004); or she may point to ways around the necessity of S* (Vetter 2015, 191). But, again, there is a combination of views that is *prima facie* compatible with dispositionalism and leads to contradiction.

4.   Responses

As we have seen, dispositionalists can respond to examples *piecemeal*, by rejecting individual premises. Such a response is ultimately unsatisfactory, however. For if there is no general response to the structural problem, dispositionalists are under threat of ever new examples being cooked up by the recipe from §2, saddling them with ever new independent, *ad hoc* commitments. Moreover, rejecting the *truth* of any problem scenario is not enough. For if any such scenario is *possible*, by the dispositionalist's lights, then dispositionalism is at best contingently true – an unstable status for a theory of modality. It is worth looking at the problem in more general, structural terms.

The heart of the problem, we believe, is a central commitment of dispositionalism: its *localism*. It consists in the twofold assumption, (L1) that potentialities themselves are typically, and indeed in the basic case, *intrinsic* properties of objects; and (L2) that such (typically intrinsic) potentialities are sufficient for possibility (cp. Vetter 2011, Vetter 2015, ch.1, Vetter 2020b, Leech 2017, Wang 2020). Dispositionalism starkly contrasts with standard possible-worlds accounts, on which what it takes for some particular propo-

sition to be possible is an entire world (cp. Adams 1974). Localism is one of the most attractive features of dispositionalism,[3] yet it is precisely what gives rise to our problem: given localism, an intrinsic property (of the right kind) anywhere in the world gives rise to a possibility. The problem is that the rest of the world might not cooperate: it might include masks, even necessary perfect masks (henceforth: NPMs).

We will substantiate this diagnosis by looking at three possible responses to the problem.

(1) Revising (Def◇): Dispositionalists may adapt their definition of possibility such that a potentiality suffices for possibility *only* in the absence of a NPM, yielding a definition of the form:

(Def◇+) It is possible that *p* iff (i) something has, had or will have an iterated potentiality for *p*, (ii) for which there exists no NPM.

In (Determinism), (Def◇+) would predict that, while *a* has a potentiality to sing, it is not possible that *a* sings. Thus (Def◇+) preserves the locality of potentiality (L1), but not of possibility (L2). For its clause (ii) requires the truth of a *negative existential*: there must be nothing *anywhere* in the world that would be a perfect necessary mask for the relevant potentiality. Whether or not a possibility holds, on (Def◇+), depends on the state of the (actual) world *as a whole*.

(Def◇+) also threatens formal adequacy. The original (Def◇) guaranteed that the defined possibility operator would be logically well-behaved by using in the definiens two operators that behave logically just like possibility: the potentiality operator, and the existence operator. Specifically, both distribute over disjunction, guaranteeing that possibility as defined in (Def◇) does so too, as is required for any normal modal logic (see Vetter

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[3]Localism is not unique to dispositionalism, but still one of its perks. Situation-based semantics (Kratzer 2020) and truthmaker semantics (Fine 2017a, Fine 2017b, Moltmann 2018) tend towards localism too, albeit on more semantic terms; essentialist views of modality (Fine 1994) share dispositionalism's localism (see Vetter 2020a).

2015, sections 5.7.2, 6.4). (Def◇+) adds new elements into the definition: conjunction, a negated existence operator, and the predicate 'NPM'. Neither conjunction nor negated existential quantifiers (equivalent to a universal quantifier) behave much like the possibility operator, and it is as yet unclear how the predicate 'NPM' behaves. There is no reason to expect, then, that the possibility operator defined in (Def◇+) will behave logically like possibility, e.g. in distributing over disjunction.[4]

(Def◇+) may also violate extensional adequacy: to many, it will seem implausible that in a case like (God) or (Determinism), it becomes *metaphysically* impossible for *a* to sing.

Moreover, the contradiction can be derived without appealing to (Def◇) and (Def□), suggesting that the problem is not at the level of (Def◇) but of potentiality itself. The is in the following footnote.[5] Dispositionalists had better attack the problem head-on, and deny that the problematic scenarios could arise. This can be done in two ways: by claiming that given a NPM,

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[4]Here is some reason to think it does not. Suppose that *a* has a potentiality to sing, for which there exists a NPM, and has no potentiality to fly, but also no NPM for that inexistent potentiality. Then *a* has an iterated potentiality to sing-or-fly (in virtue of their potentiality to sing). Assuming, plausibly, that a NPM for a disjunctive potentiality would have to be a NPM for each disjunct, there is no NPM for that disjunctive potentiality, since there is no NPM that would apply to *a*'s flying. Then *a*'s singing-or-flying meets both conditions (i) and (ii) in (Def◇+). Hence by (Def◇+), it is possible that *a* sings or flies, but it is not possible that *a* sings (by violation of condition (ii)), and it is not possible that *a* flies (by violation of condition (i)).

[5]We use the principles set out in Vetter (2015, ch. 5 and Appendix A), but with the operator $\diamond_x$ to express '*x* has an iterated potentiality for it to be the case that ...' (Vetter 2020a). Then the derivation goes as follows: Given (Potentiality),
(1) $\diamond_a \Phi a$,
which by closure of potentiality under logical equivalence (CLOSURE, Vetter 2015, 170-176) entails
(2) $\diamond_a((\Phi a \wedge q) \vee (\Phi a \wedge \neg q))$,
which by distribution of potentiality over disjunction (DISJUNCTION, Vetter 2015, 177-180) entails
(3) $\diamond_a(\Phi a \wedge q) \vee \diamond_a(\Phi a \wedge \neg q)$.
But given (PerfectMask),
(4) $\neg\diamond_a(\Phi a \wedge q)$.
And from (Necessity) via universal instantiation,
(5) $\neg\diamond_a\neg q$,
which by closure of potentiality under logical implication (CLOSURE1, Vetter 2015, 171) and modus tollens yields
(6) $\neg\diamond_a(\Phi a \wedge \neg q)$.
By propositional logic, (4) and (6) are jointly inconsistent with (3). Contradiction!

there will be no potentiality; or by claiming that given a potentiality, there will be no NPM. We will take these up in turn.

(2) No Potentiality: The dispositionalist may take NPMs to preclude the possession, not merely the manifestation, of the masked potentiality. In the problem scenarios, (Potentiality) would then be false, and in both (God) and (Determinism), *a* would lack the potentiality to sing. The strategy may be motivated by analogy to the debate about intrinsic finks and masks (Choi 2005, Clarke 2008, Clarke 2010, Ashwell 2010, Choi 2012). Here Choi has argued against intrinsically finked dispositions by appeal to a counterfactual test (would the object show the disposition's manifestation in the right circumstances?) and a nomic duplicate test (is there an intrinsic nomic duplicate of the object that clearly has the disposition?). Like intrinsically finked dispositions, potentialities with a NPM fail Choi's tests.

For dispositionalists, however, No Potentiality comes at the price of giving up localism, now at the level of potentiality itself (L1). For *a*'s potentiality to sing now *depends* on the absence of a NPM anywhere in the world (of the kind described in (God) and (Determinism), or any others) – again, a negative existential. This dependence generalizes: every potentiality will be possessed *only if* the rest of the world cooperates by not providing a NPM. As a result, no potentiality would be intrinsic to a particular object, unless that object comprises the world as a whole. The promise of locating possibilities in the makeup of individual objects is once again broken.

Dispositionalists might respond that potentialities would still satisfy the standard modal definition of intrinsicality (Langton and Lewis 1998): because NPMs are necessary, they apply to all of *a*'s metaphysically possible duplicates. If there is no metaphysically possible duplicate of *a* with the potentiality to sing, *a*'s lack of the potentiality is intrinsic after all; and *mutatis mutandis* for the possession of potentialities without NPMs. But the modal definition of intrinsicality does not fit the dispositionalist project. First, dispositionalism seeks to reduce modality to intrinsic properties; if in-

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trinsic properties are in turn defined in modal terms, conceptual circularity looms. Second, the modal definition of intrinsicality will vastly overgenerate on a view which, like dispositionalism, envisages substantial necessities and anti-Humean necessary connections. Specifically, in (Determinism) the definition makes *all* properties of all objects intrinsic, since it makes everything necessary, hence shared among all possible duplicates. Dispositionalists are better off with a non-modal definition of intrinsicality. Accordingly, we have framed the intrinsic/extrinsic distinction in terms of dependence (see also Vetter 2015, 122f.).

In addition to renouncing localism, No Potentiality runs into extensional and formal problems analogous to Revising (Def$\diamond$+): it has to deny metaphysical possibilities that one would intuitively expect to obtain, such as the possibility of *a* singing in (God) and (Determinism); and it is unclear that potentiality so understood would still behave logically like a standard possibility operator, e.g., distribute over disjunction.

(3) No Mask: A final response insists on localism: potentialities are both intrinsic and sufficient for possibility. Hence they must also be sufficient to exclude NPMs. In (Determinism), this is to say that the agent's intrinsic potentiality to sing precludes the combination of strong, deterministic laws with a necessary first state. Instead of individual potentialities depending on the state of the whole world (i.e., the presence or absence of an NPM anywhere) as in No Potentiality, we now have the state of the whole world depending on individual potentialities. The response looks bizarre: how could such a local matter as one agent's potentiality to sing have such profound and pervasive impact?

Here is one way. In (Determinism), the necessity of the universe's beginning results from a mere lack of countervening potentiality. *Contra* Vetter (2015), one might think that's not enough to exclude a possibility, and require that necessities, like possibilities, have positive grounds. In the absence of such a positive ground, positive potentialities have primacy. Hence it may

be thought that an agent's potentiality to sing 'overrules' the absence of potentialities at the beginning of the universe, and makes a different beginning possible. The proposal, however, is limited in scope. When there *is* a positive ground for a necessity (e.g., plausibly, in (God)), the dispositionalist would have to adopt another strategy – probably No Potentiality. Moreover, the response requires a nuanced view of how potentialities (and other factors) must be coordinated (in analogy, perhaps, to the coordination required for laws, cp. Williams 2010). It is unclear to what extent this route could preserve localism; it is certainly not the view defended in Vetter 2015, or any other extant dispositional account.

5. Conclusion

Dispositionalists face a dilemma: either envisage the threat of contradictory scenarios or abandon localism, a central and motivating feature of the account (with formal and extensional problems looming). It is up to dispositionalists to try and resolve this dilemma by giving a general solution to the problem of necessary perfect masks. [6]

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